

**RANGE EXTENSION OF *PALAEMNEMA DOMINA* CALVERT
(ODONATA: PLATYSTICTIDAE) TO SOUTHEASTERN ARIZONA, U.S.A.:
A NEW ODONATE FAMILY FOR THE UNITED STATES**

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Abstract.—The occurrence of a population of *Palaemnema domina* Calvert in southeastern Arizona, U.S.A. extends the known northern range limit of this species from Chihuahua, Mexico. It is the first record of the Platystictidae for the United States. Notes on adult perching habits and a brief habitat description are provided.

Key Words: damselflies, Platystictidae, Zygoptera, Odonata, Arizona

Four families of damselflies (suborder Zygoptera) have traditionally been recorded and diagnosed for the United States: Calopterygidae, Lestidae, Protoneuridae, and Coenagrionidae (Westfall 1987, Borror et al. 1989, Westfall and Tennesen 1996). We report the addition of a fifth family, Platystictidae, to the United States Zygoptera fauna. The Platystictidae are a pantropical family containing a single Neotropical genus, *Palaemnema* Selys, of 42 described species. Westfall and May (1996) provide an excellent introduction to the taxon.

A single male *Palaemnema domina* Calvert was collected by JH on the Muleshoe Ranch Preserve along Hot Springs Creek about 2 miles north of Hookers Hot Springs, Arizona, on 20 August 1996. Subsequent collections and observations by JH and JH and RWG were conducted on 20–21 September 1996; and on 17 July and 10 August 1997. These collections extend the known range of *P. domina* approximately 500 km from its previous northernmost collection locality in Chihuahua, Mexico, near

Yepachic (S. Dunkle, personal communication). The species has also been recorded from Morelos and Nayarit states, Mexico (Paulson and Gonzalez-Soriano 1996), from desert streams in Chiapas and Oaxaca states, Mexico, as well as eastern Guatemala and Nicaragua (T. W. Donnelly, personal communication) and Honduras (Paulson 1997).

Palaemnema domina Calvert
(Fig. 1)

Palaemnema domina Calvert 1905: 134, 137 (description, key); Calvert 1905: 145–212. Odonata.

New records.—U.S.A., Arizona, Cochise County, Hot Springs Creek, 1190 m: VIII-20-96, J. D. Hoekstra, 1 ♂ (TWD); VII-17-97, J.D. Hoekstra, 1 ♀ (UAIC); Hot Springs Creek, 1,175 m, 32°21.31N, 110°15.63W: IX-20-96, J.D. Hoekstra and R. W. Garrison, 6 ♂, 2 ♀ (RWG), 1 ♀ (TWD); IX-21-96, J. D. Hoekstra and R. W. Garrison, 1 ♂ (RWG); VIII-10-97, J. D. Hoekstra, R. W. Garrison, J. Garrison, P. Garrison, 1 ♂, 1 ♀



Fig. 1. *Palaemnema domina*, adult male perching near base of tree. Photo by Rosser Garrison.

(UAIC), 12 ♂, 1 ♀ (RWG), S. Dunkle, 10 ♂, 2 ♀ (SD).

Abbreviations: RWG = R. W. Garrison personal collection. UAIC = University of Arizona Department of Entomology Insect Collection. TWD = T. W. Donnelly personal collection. SD = S. W. Dunkle personal collection.

Adult behavior.—Adults of *Palaemnema domina* aggregate in shady microhabitats and avoid the sunny situations usually favored by Odonata. When the species was first discovered at Hot Springs Creek, males were active during a light mid-afternoon rain when all other odonates had ceased activity. On hot, clear days (air temperature 30°C or higher), adults have been found only in humid, dark, cave-like riparian roosting sites. These cavities are formed within piles of woody debris that are heaped over the tangled root matrices at the bases of large riparian trees. Such flood-created habitats are often found several meters from the stream, and must be subject to vi-

olent disturbance and alteration during flash floods.

Several adults of both sexes aggregate within roosting sites; up to eight males have been counted from a single site (S. W. Dunkle, personal communication). Such troglodytic perching behavior is unusual for odonates, but is typical of Platystictidae, which commonly aggregate in shady roosting areas (T. W. Donnelly, personal communication). Similar reclusive behavior was observed for *Palaemnema desiderata* Selys, an Atlantic coast Mexican species found along humid, largely shaded lowland streams. In this case, several individuals of both sexes were observed roosting within densely vegetated microhabitats (Garrison and Gonzalez 1988). The reproductive behavior of *P. domina* is unknown. In a Mexican population of *Palaemnema desiderata*, copulation and oviposition are initiated just before sunrise. Eggs are deposited in the woody stems of riparian vegetation overhanging the stream (Gonzalez et al. 1982).

We observed males of *P. domina* perching in full sun at 10:30 am on young cottonwoods at streamside when humidity remained high (air temp. 21°C). By 11:30 on the same day, all adults had moved to heavily shaded perching sites.

Habitat description.—Hot Springs Creek is a small perennial stream south of the Galuro Mountains in southeastern Arizona. The stream and its watershed are contained within the Muleshoe Ranch Cooperative Management Area, a 49,120-acre area managed for biodiversity protection by the Nature Conservancy, U.S. Forest Service, and U.S. Bureau of Land Management. *Platanus wrightii* Watson (Arizona sycamore), *Populus fremontii* Watson (Fremont cottonwood), and *Salix spp.* (willows) are the dominant riparian trees. The stream at summer base flow is 1.5–2 m wide in the area visited by the authors. Midstream depth is 30–50 cm.

The stream hosts several species of native fish and amphibians and a diverse community of aquatic insects. Several of the species present have Mexican biogeographic affinities; a waterscorpion, *Curicta pronotata* Kuitert (Hemiptera: Nepidae), at the northern limit of its range has been collected from a tributary to the habitat (Hoekstra and Smith 1998). The thermal regime of Hot Springs Creek is poorly understood, but could be significantly affected by geothermal inputs. Hot springs (outflow 52°C) and warm springs (outflow 33°C) are found upstream of the study area but do not drain directly into the perennial part of the stream (U.S. Geological Survey staff, personal communication).

FAMILY LEVEL TAXONOMY OF UNITED STATES ZYGOPTERA

With the discovery reported here, keys to the U.S. families of Zygoptera should be revised to include Platystictidae. For adults, this can be accomplished with addition of a couplet to separate platystictids from Protoneturidae. The diagnostic character is the unique short crossvein linking Cu with the wing margin proximal to Ac in Platysticti-

dae (Westfall and May 1996). For larvae, most keys to the North American Zygopteran families segregate Calopterygidae and Lestidae first, based on antennal and premental characters. Once these families have been separated, the diagnostic character for Platystictidae is the medial cleft of the prementum indicated by a deep sulcus (Westfall and May 1996). Several other peculiarities distinguish the unusual larvae, which have been described as "termite-like" in general appearance (Westfall 1987).

Barring exotic species introductions, we expect that additional discoveries of new Zygopteran families are unlikely in the contiguous U.S. One exception might be southern Texas where collectors may discover Pseudostigmatidae. Two genera (*Mecistogaster* Rambur and *Pseudostigma* Selys) are known from Tamaulipas and Nuevo Leon states in neighboring Mexico (Westfall and May 1996). However, their large size and conspicuous behavior make it unlikely that these damselflies would have been overlooked in this heavily populated region.

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LITERATURE CITED

- Borror, D. J., C. A. Triplehorn, and N. F. Johnson. 1989. An Introduction to the Study of Insects (Sixth edition). Saunders College Publishing, Fort Worth, Texas, U.S.A.
- Calvert, P. P. 1905. Odonata, pp. 145–212 *In* Biologia Centrali-Americana: Insecta: Neuroptera. R.H. Porter & Dulau Co., London.
- Garrison, R. W. and E. Gonzalez-Soriano. 1988. Population dynamics of two sibling species of neo-

- tropical damselflies, *Palaemnema desiderata* Selys and *P. paulitoiyaca* Calvert (Odonata: Platystictidae). *Folia Entomologica Mexicana* 76: 5–24.
- Gonzalez-Soriano, E., R. Novelo-Gutierrez, and M. Verdugo-Garza. 1982. Reproductive behavior of *Palaemnema desiderata* Selys (Odonata: Platystictidae). *Advances in Odonatology* 1: 55–62.
- Hoekstra, J. D. and R. L. Smith. 1998. Distribution and habitat of *Curicta pronotata* (Hemiptera: Nepidae) in southeastern Arizona. *Entomological News* 109: 366–368.
- Paulson, D. R. 1997. The Odonata of Middle America by Country. Internet document ©University of Puget Sound, available at: <http://www.ups.edu/biology/museum/ODofMA.html>
- Paulson, D.R. and E. Gonzalez-Soriano. 1996. The Odonata of Mexico by State. Internet document ©University of Puget Sound, available at: <http://www.ups.edu/biology/museum/ODofMexico.html>
- Westfall, M. J. 1987. Order Odonata, pp. 95–117 *In* Stehr, F.W., ed., *Immature Insects*, Vol. 1. Kendall/Hunt, Dubuque, Iowa, U.S.A.
- Westfall, M. J. and M. L. May. 1996. *Damselflies of North America*. Scientific Publishers, Gainesville, Florida, U.S.A.
- Westfall, M. J. and K. J. Tennessen. 1996. Order Odonata, pp. 164–211 *In* Merritt, R. W. and K. W. Cummins, eds., *An Introduction to the Aquatic Insects of North America*. Kendall/Hunt, Dubuque, Iowa, U.S.A.